to Dr. *Halley*'s Account of it, in the *Philoſophical Tranſactions* (Numb. 183.) in which I entirely acquieſce, having always found it agreeable to the *Phænomena*.

If by publiſhing theſe Thoughts, I have explained the Riſe of Vapours, in a more ſatisfactory Way than has been done before; or if I have only given uſeful Hints to others more capable of doing it, I have my End.

P. S. Since I have, for Brevity ſake, only mentioned at what Heights from the Surface of the Earth, Vapours of different Denſities will come to an *Æquilibrium*, without giving a Reaſon for ſettling the Place of *Æquilibrium*, at thoſe Heights; I think proper to give the Method here by which they are to be found, *viz.* As the Vapours will ſettle and riſe where the Air is of the ſame Denſity with themſelves; it is only required to find the Denſity of the Air at any Diſtance from the Earth, at ſeveral Heights of the Barometer, which may be deduced from Dr. *Halley*'s two Tables, *Philoſoph. Tranſact.* Num. 386. (the Firſt ſhewing the Altitude to given Heights of the Mercury, and the Second the Heights of the Mercury at given Altitudes) and knowing the Degree of Heat by the Thermometer, becauſe the Denſity of the Vapour depends upon the Degree of Heat of the Seaſon; provided that proper Allowances be made for the great Rarefaction of the Air near the Earth in hot and dry Weather, and the Condenſation of the Vapours in their Riſe, by reaſon of the Air being colder at a little Height above the Earth than juſt at the Surface of it.

IV. *An Account of ſome Obſervations relating to* Natural Hiſtory, *made in a Journey to the* Peak *in* Derbyſhire, *by Mr.* J. Martyn, *F. R. S.*

THE *Peak* in *Derbyſhire*, having hitherto been deſcribed in ſcarce any other Light, than as a Place compoſed of Wonders; I was not a little deſirous to make ſome Enquiry into the Nature of a Place generally eſteemed one of the moſt Surprizing of our own Country.

In my Way thither, I took Notice of the following Plants, which I have not obſerved to be common

mon in other Parts of *England*, and are not taken Notice of by the Biſhop of *London*, in his Edition of *Cambden*.

Stachys Fuchſii, *J. B.* In the Road to *Grantham*, a little beyond *Coleſworth*.

Scrophularia Scorodoniæ, *folio Mor.* At *Wollerton*, under the Garden-wall. This does not owe its Origine in this Place to Seeds, ſcattered out of the Garden; as I am convinced, by the peruſal of a Manuſcript Catalogue of the Plants cultivated in that Garden, in which there is no mention made of this Plant.

The *Lychnis*, which grows on *Nottingham-Caſtle*, is the *Lychnis ſylveſtris alba* 9 *Cluſii*, and not the ſame with Mr. *Ray*'s *Lychnis major noctiflora Dubrenſis perennis*, as he ſuſpected.

Feſtuca humilior panicula brevi heteromalla. Gramen paniculatum, bromoides, minus, paniculis ariſtatis, unam partem ſpectantibus Raii Syn. On *Sherwood Foreſt*.

Salix folio laureo, ſeu lato glabro odorato Phyt. Brit. Common about *Wingerworth*.

Ladanum arvenſe, flore amplo luteo; labro purpureo. Lamium cannabinum, flore amplo luteo, labio purpureo Raii Syn. In the Corn in ſeveral Places.

Filix mas non ramoſa, pinnulis anguſtis, raris, profunde dentatis Ger. emac. Common about *Wingerworth*.

The *Peak* is famous for ſeven Places, which have been dignified by our Anceſtors, with the Name of Wonders: 1. *Chatſworth*, a magnificent Seat of his Grace the Duke of *Devonſhire*; 2. *Mam-tor*; 3. *Elden-hole*; 4. *The ebbing and flowing Well*; 5. *Bux-*

5. *Buxton-Well*; 6. *Peak's Hole*, and 7. *Pool's Hole*. The Firſt being a Work, not of Nature, but Art, does not come within the Deſign of this Account. *Mam-tor* is a huge Precipice facing the Eaſt, or South-Eaſt; which is ſaid to be perpetually ſhivering and throwing down great Stones on a ſmaller Mountain below it; and that nevertheleſs, neither the one increaſes, nor the other decreaſes in Bigneſs. This Mountain is compoſed chiefly of a Sort of Slate-Stone (called in that Country *Black Shale*) and great Stone. The Nature of the *Black Shale* is known to be, that notwithſtanding it is very hard before it is expoſed to the Air; yet it is afterwards very eaſily crumbled to Duſt. Thus on any Storm, or melting of Snow, this Shale is conſiderably waſted; and as the great Stones are gradually diſengaged, they muſt neceſſarily fall down. That it is only at theſe Times that the Mountain waſtes, is affirmed by the moſt intelligent of the neighbouring Inhabitants: And that this Decay is not perpetual, I can affirm myſelf; having not only taken a cloſe Survey of it, but alſo climbed up the very Precipice, without ſeeing any other ſhivering in the Mountain, than what the treading of my own Feet in the looſe crumbled Earth occaſioned. That the Mountain does not decreaſe in the mean Time, is a Tale too frivolous to need any Conſideration.

Elden-hole, is a huge perpendicular Chaſm. The Depth of it is not known. Mr. *Cotton* tells us, that he ſounded 884 Yards, and yet the Plummet drew. But he might eaſily be deceived, unleſs his Plummet was of a very great Weight; for otherwiſe, I imagine the

the Weight of a Rope of that Length, would be ſo great as to make the Landing of the Plummet ſcarce perceivable. Be that as it will, the Depth of it is to be ſure very conſiderable; and conſidering that we have no where in *England* ſo good an Opportunity of ſearching the Bowels of the Earth to ſo great a Depth; I wonder no curious Perſon has ever had the Courage to venture down. It is ſaid indeed, that a poor Fellow was hired to be let down with a Rope about his Middle, two hundred Yards; and that he was drawn up again, out of his Senſes, and died a few Days after: And no Wonder, for the poor Wretch having nothing elſe to reflect on in that diſmal Place, but the Danger he had put himſelf into for the Sake of a little Money, might probably be fright'ned out of his Senſes. Or indeed the very Fatigue itſelf might put him into that Condition; as any one will eaſily imagine, who has been let down but a quarter of the Way, and drawn up again in that Manner. But I conceive, that if any intelligent and prudent Perſon was to be let down in a proper Machine; he would not be much in Danger, and his Fatigue would be very inconſiderable.

The *ebbing and flowing Well* is far from being regular, as ſome have pretended. It is very ſeldom ſeen by the Neighbours themſelves; and, for my Part, I waited a good while at it to no Purpoſe: And ſo I ſhall paſs it over in Silence.

Buxton-Well has been eſteemed a Wonder, on account of two Springs, one warm and the other cold, riſing near each other. But the Wonder is now loſt, both being blended together. The Spring

which is now uſed for bathing, appears to be 32 ½ Degrees of one of Mr. *Hawksbee*'s Thermometers warmer than the common ſpring Water there *. Statical Experiments on the Effects of warm bathing having been ſeldom made, I hope a few, which I had an Opportunity of making, will not be unacceptable.

		Weight. lb. ʒ.	After bathing 12 Minutes.	Urine.
July 21. 1728. h. 10 ½ at Night.	A.	137 12	137 11 ⅛	3 ʒ
	B.	134 15 ½	134 13 ⅘	
	C.	169 15	170 —	
	D.	119 6 ½	119 7	4 ʒ

			Urine. ʒ.	Weight after 1 h.	after bath. 20 Min.
22 h. 8 ½ Morning.	A.	136 9	9 ½	135 15	136 —
	B.	134 1	7	133 7	133 11
	C.	168 13	13	167 11	167 14
	D.	118	15	117 —	117 —

				Perſp.
h. 11. after eat. Cloaths changed.	A.	137 5	After h. 1 ½ Exerciſe chiefly un. Ground in *Pool's Hole*. 1	10 ½ ʒ
	B.	140 7		13 ʒ
	C.	170 4 ½		— lb
	D.	117 8		8 ½ ʒ

		lb ʒ	ʒ	
Aft. Din. Cloaths changed.	A.	136 14	3	Perſpiration in 1 ½ h. where note, that all uſed moderate Exerciſe, walking about, except D, who ſate ſtill reading the whole time.
	B.	142 6 ½	7 ½	
	C.	170 15	3	
	D.	119 1	6 ½	

* The Spring Water kept the Spirit of Wine at 41, the Bath Water raiſed it to 8 ½.

Ser.

	Weight.	Aft. 1 h. bath.	Aft. 1. h. Perſp.
Servant who attended the Bath.	℔ ʒ 173 4	℔ ʒ 173 6	℔ ʒ 172 15

From theſe Experiments may be concluded,

1*ſt*, That warm bathing increaſes the Weight of the Body for the preſent; though it cauſes a plentiful Perſpiration afterwards: Which I do not remember that any one has hitherto obſerved.

2*dly*, That the Perſpiration after this Exerciſe is nothing near ſo large as Dr. *Keill* * has delivered; t amounting by his Account to one Pound and a half n one Hour's Time. By our Obſervation it is but ive Ounces in one Hour, and from eight Ounces and half to one Pound, in one Hour and a half, though ſiſted by Motion; which might have cauſed us to erſpire (by Dr. *Keill*'s Computation †) from three to x Ounces.

Peak's Hole and *Pool's Hole* are two remarkable hori- ntal Openings under Mountains, the one near *Ca- eton*, the other juſt by *Buxton*. They ſeem to me have owed their Original to the Springs which have eir Current through them. It is eaſy to imagine it when the Water had forced it's Way through the rizontal Fiſſures of the *Strata*, and had carried the ſe Earth away with it, the looſe Stones muſt of

* Med. Stat. p. 16.

† Calore, motu & exercitio unciæ 2 vel 3 interdum 4 perſpiratione uni- us horæ expelluntur. Med. Stat. p. 15.

Courſe fall down; and that where the *Strata* had few or no Fiſſures, they remained entire, and ſo formed thoſe very irregular Arches which are ſo much wondered at in theſe Places. Whether this be the true Origine of theſe Caves or not, I ſubmit to thoſe who ſhall hereafter have the Curioſity to examine. It ſeems more probable to me, than what others have hitherto propoſed. The three Rivers, as they are commonly called, in *Peak's-Hole* are only ſome Parts of the Cave deeper than the reſt, and receiving all their Water from the Spring which comes from the farther End of the Cave. The Water which paſſes through *Pool's-hole* is impregnated with Particles of Limeſtone, and ſo has incruſted almoſt the whole Cave in ſuch a Manner, that it appears like one ſolid Rock.

The more rare Plants which I obſerved in the *Peak* are,

Scariola ſylveſtris Anguillaræ. Lactuca ſylv. murorum flore luteo J. B. On old Walls and about the Entrance into *Peak's-hole*. It grows alſo in *Hertfordſhire*. I chooſe to take Notice of it on this Occaſion, the rather becauſe *M. Vaillant* has evidently miſtaken the Characters of it in his new Diſtribution of the *Cichoraceous Tribe* in the *Memoirs of the Royal Academy of Sciences* for the Year 1721. He there makes it a Species of *Lactuca*, from which it is very different on his own Principles. According to his Method, the *Empalement* of the *Lactuca* is *ſquamous*, and the *Down* of the Seed ſits upon a *Pedicle*. But this Species has a *ſimple Empalement* and a *ſeſſile Down*. Theſe Characters evidently diſtinguiſh it not only from *Lactuca*, but from every *Genus* in his Method. I ſhall take leave therefore to conſtitute a new *Genus*:

And as the Name of *Scariola*, by which *Anguillara* has called it, has not yet been appropriated to any other *Genus*, I ſhall appropriate it to this, and define it, as follows.

Scariola is a *Cichoraceous Plant*, with a *ſimple Empalement*, a *naked Placenta*, and *Seeds* crowned with a *hairy ſeſſile Down*.

Roſa ſylv. alba cum aliquo rubore foliis hirſutis J. B. In ſeveral Hedges about *Hatherſedge*.

Empetrum montanum fructu nigro Tourn. Common on the Mountains.

Oxycoccus, ſeu Vaccinia paluſtria, J. B. On boggy Places, but not very common.

Erica humilis cortice cinereo Arbuti flore albo, H. R. Par. On the Mountains near *Hatherſedge*.

Rubus Idæus ſpinoſus fructu rubro, J. B. In the Hedges.

Geranium ſaxatile Ger. emac. About the Entrance into *Peak's-hole*.

Cochlearia rotundifolia minima Merr. With the preceeding.

Thalictrum minus Ger. In the ſame Place.

Lichenoides ſaxatile, fuſcum, piloſum, varie diviſum. Corallina fuſca folioſa Doody Budd. Hort. ſicc. On the Rocks.

Lichenoides ſaxatile tinctorium foliis piloſis purpureis Dillenii. On the Rocks.

Uſnea ſaxatilis, capillacea. Muſcus corallinus, ſaxatilis, fœniculaceus Raii Syn. On the Rocks near *Darwent*.

Lycopodium Sabinæ facie Fl. Jen. On the Mountains near *Darwent*.

Selago

Selago foliis & facie Abietis Fl. Jen. On the Mountains near *Darwent.*

Bryum Hypnoides capitulis, plurimis erectis lanuginoſum Dillenii. On the Mountains.

Cardamine impatiens altera hirſutior Raii Syn. About the Mouth of *Pool's-hole* plentifully.

A Variety of Mr. *Ray's Viola montana lutea* with a blue and yellow Flower.

The *Lead-mines* in *Derbyſhire* are very various with regard to their Courſes. One into which I went down, had two Branches; one running to the N. E. the other to the N. W. And as I was informed, one of the beſt they ever diſcovered ran due North. Their Breadth and Depth are full as irregular. The Bodies through which they dig to come at the Vein are generally *Limeſtone* and *Black Shale.* But it is uncertain which of the two is uppermoſt. Of two Mines into which I went down, in one they had dug firſt through 26 Yards of *Limeſtone*, then through one of *Black Shale:* In the other firſt through 42 Yards of *Shale*, and then through 28 of *Limeſtone.* The Subſtances which they find mixt with the *Ore*, are

1. *Chert.* This is a kind of *Flint*, which Dr. *Woodward** ſays is called ſo, when it is found in thin *Strata.* But in the *Peak* the *Strata* of *Chert* are often four Yards thick, or thicker. They are found in *Limeſtone*, and not always diſpoſed in *Strata.* Thoſe which I took Notice of were generally either black, or of ſuch a Colour as the inſpiſſated Juice of the *Buckthorn* Berries, which the Painters call by the Name of *Sap-green:* Whence they are called *Green Cherts* and *Black Cherts.*

* Method of Foſſils, p. 21.

2. *Spar.*

2. *Spar.* This is compoſed of *Cryſtal* mixt with other Bodies. Thoſe which they call *Sugar-ſpars*, are thoſe whoſe Cryſtalliſations are very ſmall, and ſo on crumbling to Pieces have the Appearance of powdered Sugar. I have two Sorts of theſe; white and blue. *Dog-tooth Spar* is a white pointed Spar, in Form and Colour ſomething reſembling Teeth.

3. *Cauk.* This Dr. *Woodward* * ſays is a coarſe talky Spar. But in that Subſtance which I met with in this Country under the Name of *Cauk*; I could not diſcover any Flexibility or Elaſticity, which that learned Writer has ſet down as Characteriſticks of *Talk* and *Talky Bodies.* † It ſeems to me to be nothing but *Spar* incorporated with a coarſe earthy Matter. When this *Cauk* is mixt with pellucid Cryſtalliſations of *Spar*, it is called Baſtard Cauk.

There are ſeveral other Bodies mixt in the Mines with *Lead-ore:* But as they did not occur in thoſe Mines which I examined, I ſhall omit the Mention of them.

When the *Ore* is brought up from the Mine it is broken to Pieces that the *Spar*, *Cauk*, or other Bodies which adher'd to it may be the more eaſily ſeparated. It is then thrown into a large Sieve and waſhed, and ſo farther purified from extraneous Bodies. After this, it is carried to the Furnace in order to be ſmelted. The Furnace, which I ſaw near *Workſworth*, was very rude and ſimple, conſiſting only of ſome large rough Stones, placed in ſuch a Manner as to form a ſquare Cavity, into which the Ore and Coals are thrown *ſtratum ſuper ſtratum*; two great Bellows continually blowing the Fire, being moved alternately by Water. I ſaw

* Method of Foſſils, p. 18. † Catalogue of Foſſils, Vol. i. part i. p. 57.

no

no other Fuel uſed on this Occaſion but dried Sticks, which they call white Coal. * Mr. *Ray* informs us, that they uſe both white and black Coal or Charcoal in *Cardiganſhire*. I ſuppoſe becauſe that Ore is harder to flux; the Charcoal making a more vehement Fire. They generally throw in ſome Spar along with the Ore, which is thought by imbibing the Sulphur to make it flux more eaſily. They frequently throw in alſo ſome Cowke (or Cinders of Pit-coal) becauſe they think it attracts the Droſs, and ſo makes an eaſier Separation of it from the Lead. When the Ore is melted, it runs out at an Opening in the Bottom Part of the Front of the Furnace, through a ſmall Channel made for that Purpoſe, into a cylindrical Veſſel, out of which it is laded into the Mould. The Droſs of the *Ore* on ſmelting is called *Slag*. This *Slag* is afterwards ſmelted again with Cowke only, and the Lead obtained from it is called *Slag-lead*. Their Way of making *Red-lead* is the ſame with † Mr. *Ray*'s Account; only they uſe three Parts of Lead, and one of *Slag-lead*; and think that the *Red-lead* made thus is better than if made without *Slag-lead*.

* Collection of *Engliſh* Words, Ed. 2. p. 174. † Ibid. p. 200.

V. *The*